

# SOROBAN

USEFUL      ARITHMETICAL      TOOL



- The League for Soroban Education of Japan, Inc.

## PREFACE

Soroban, an uncommon word for you perhaps, is what you see in this picture.

In Japan this soroban has been used accurately and rapidly since 500 years ago.

There are many computers nowadays in this electronic age. However, we are still using soroban in banks, business offices and at home for all sorts of calculations.

Soroban is also used as an effective education tool, especially for lower-grade students to understand basic number systems as follows;

1. Soroban has the very simple structure displays the numbers the same way as the decimal system.
2. Easy to understand base-ten and place value for children.
3. You can determine the calculating process step by step.
4. Using a calculating device motivates children to have an active attitude toward study.
5. Practicing soroban develops the children's anzan ability.

We believe soroban is good for both business and educational fields as one of the products of Japanese culture and therefore we would like to introduce the use of soroban all over the world.

We also hope the introduction of soroban will contribute to mutual understanding and the happiness of human beings. We, therefore, wrote this booklet for the above purpose.

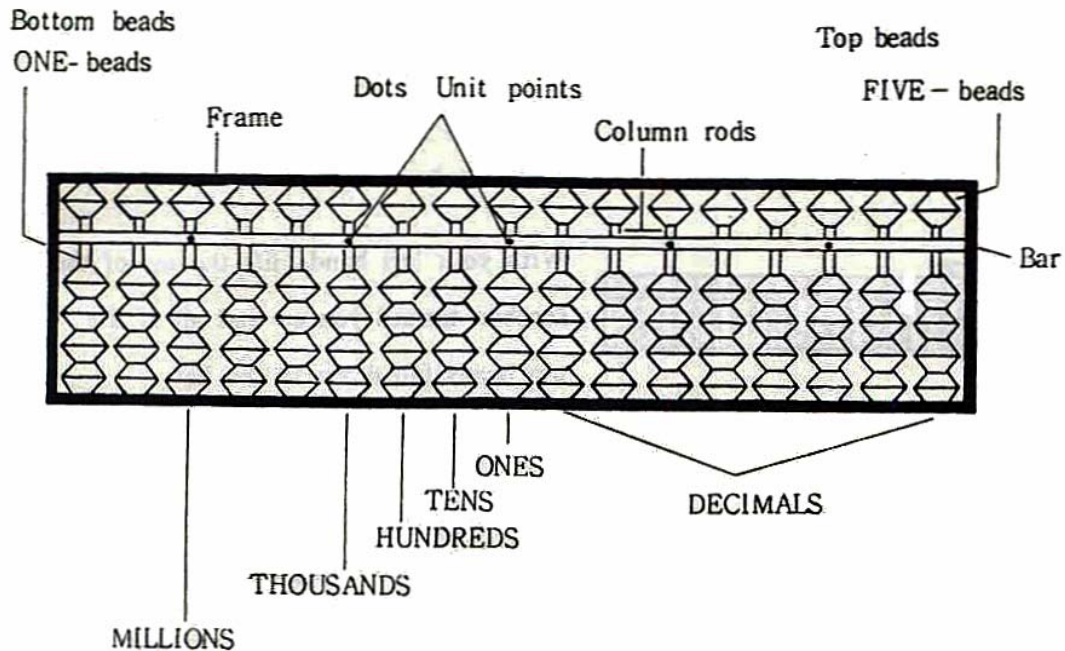
We are happy if you are interested in studying soroban.

- The League for Soroban Education of Japan, Inc.

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## 1. Part of Soroban



### Structure of Soroban

As illustrated above, the Soroban is calculating instrument with a number of counting beads that slide back and forth along rods.

A cross bar (center bar) divides the Soroban into two parts. The upper part consists of row of the 5-value beads and the lower consisting four rows of the one-value beads. Every single bead above the bar has the value of “five” and the beads below the bar have a value of “one” respectively.

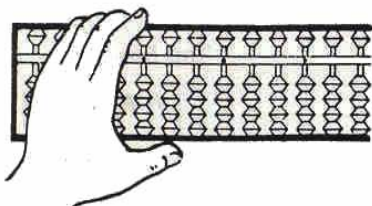
The columns, toward the left always have higher values than those toward the right.

Dots are to be used to indicate the unit point of numbers or a decimal point.

### 3. Display of Numbers on Soroban

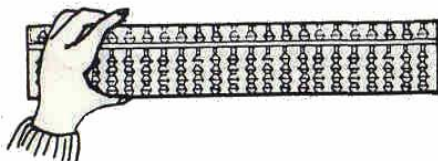
### (1) Initial Operation

Here is an easy way to clear the soroban and make it show zero:



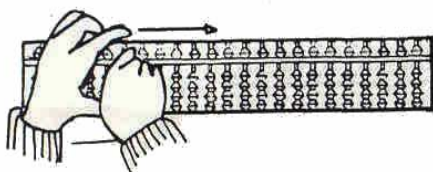
Sit at a desk when you use soroban.

Lay the soroban flat on the desk in front of you, and hold the frame with your left hand as shown.



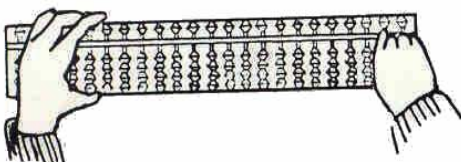
With your left hand, lift the top of the soroban toward you so that all of the top beads fall down to the bar.

Gently lay the soroban down flat.



Move your right forefinger from left to right along the upper edge of the bar.

This will push up all the top beads.



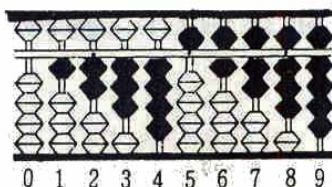
When all beads are pushed away from the bar (all top beads up and all bottom beads down),

the soroban shows ZERO.

## (2) How to Display Numbers

The values of counting beads are determined by their positions. They obtain values when they are pushed toward the center bar lose them when pushed away from the bar.

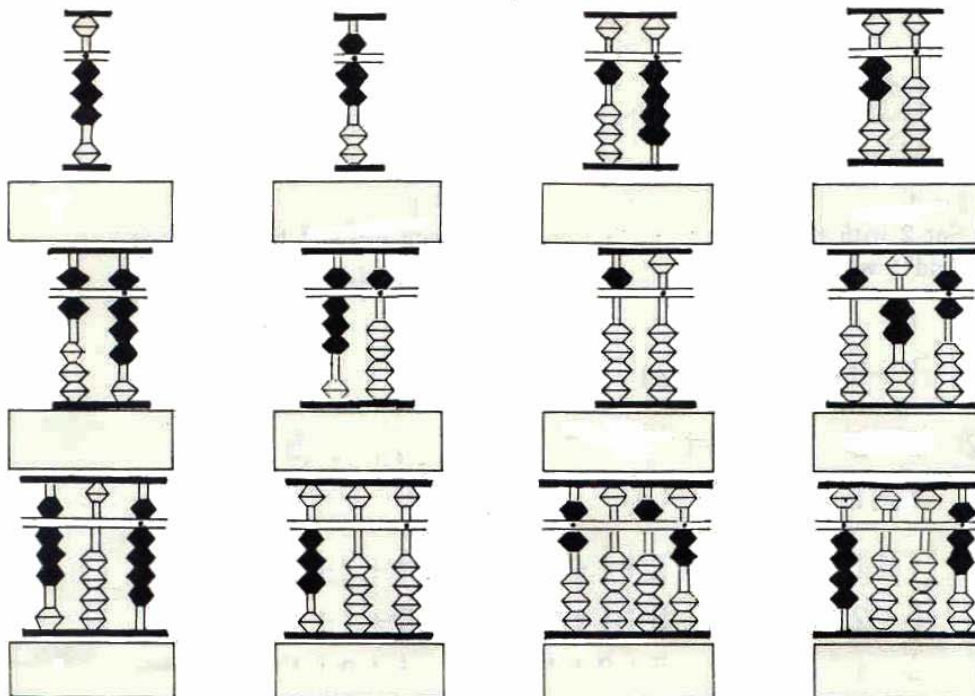
Numbers one to nine can be displayed on the Soroban as shown in the following chart.





#### 4. Let's Read Soroban

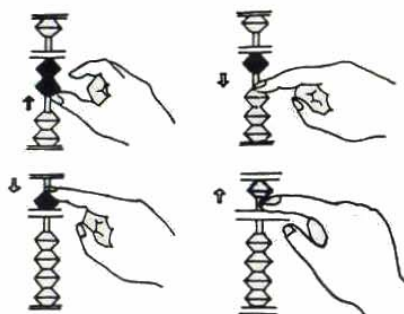
Write the correct number under each picture.



#### 5. Fingering

The following symbols are used to indicate the movement of counting beads and the use of fingers.

- ◊ Bead left intact and/or returned home position
- ◆ Bead being moved for calculation
- ⇕ Slide up or down the bead with forefinger
- ↑ Slide up the bead with thumb



Always use the thumb to add bottom beads.  
This is the only time the thumb is used.

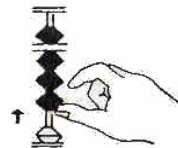
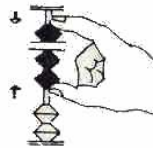
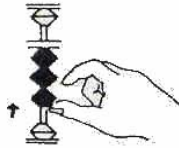
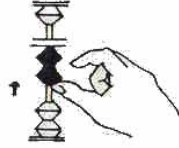
It never goes above the bar.  
Always use the forefinger to subtract bottom beads.

Always use the forefinger to add top beads.

Always use the forefinger to subtract bottom beads.

## B. CALCULATION BY SOROBAN

### STEP 1



2 + 1

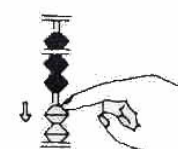
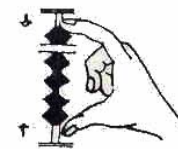
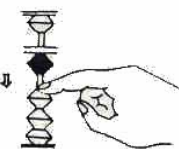
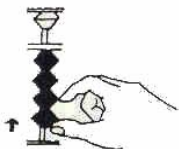
- 1) Set 2 with thumb
- 2) Add 1 with thumb

7 + 1

- 1) Pinch top and bottom beads
- 2) Add 1 with thumb

①	1 + 1	2 + 1	2 + 2	3 + 1
	1 + 3	11 + 21	22 + 12	24 + 20
②	5 + 3	7 + 1	6 + 3	5 + 2
	8 + 1	65 + 14	76 + 22	50 + 10
③	1 + 1 + 2	2 + 1 + 1	1 + 2 + 1	
	5 + 2 + 1	5 + 1 + 2	7 + 1 + 1	
	6 + 1 + 2	5 + 3 + 1	6 + 2 + 1	

### STEP 2



4 - 3

- 1) Set 4 with thumb
- 2) Subtract 3 with forefinger

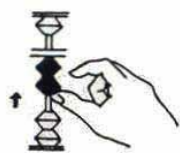
9 - 2

- 1) Set 9, pinch top and bottom beads
- 2) To subtract, use forefinger.

①	2 - 1	4 - 1	4 - 3	4 - 2
	3 - 1	44 - 32	34 - 21	41 - 20
②	9 - 2	8 - 1	7 - 1	8 - 3
	6 - 1	97 - 32	89 - 34	90 - 10
③	4 - 2 + 1	1 + 2 - 3	3 - 1 - 2	
	5 + 4 - 3	8 + 1 - 4	7 - 2 + 3	
	8 - 3 + 1	7 + 2 - 3	9 - 1 - 2	

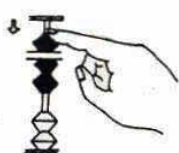
④	$\begin{array}{r} 11 \\ 13 \\ -24 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 23 \\ -31 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ 12 \\ -30 \\ \hline \end{array}$	$\begin{array}{r} 43 \\ -12 \\ 13 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 20 \\ -34 \\ \hline \end{array}$	$\begin{array}{r} 34 \\ -12 \\ 21 \\ \hline \end{array}$
	$\begin{array}{r} 75 \\ 12 \\ -31 \\ \hline \end{array}$	$\begin{array}{r} 68 \\ 31 \\ -42 \\ \hline \end{array}$	$\begin{array}{r} 78 \\ 20 \\ -41 \\ \hline \end{array}$	$\begin{array}{r} 67 \\ -12 \\ 23 \\ \hline \end{array}$	$\begin{array}{r} 58 \\ 41 \\ -32 \\ \hline \end{array}$	$\begin{array}{r} 89 \\ -21 \\ 30 \\ \hline \end{array}$

### STEP 3



2 + 5

- 1) Set 2 with thumb
- 2) Add 5 with forefinger



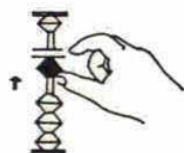
7 - 5

- 1) Pinch together 7 (5 and 2)
- 2) Subtract 5 with forefinger

①	$3+5$	$1+5$	$4+5$	$23+15$		
	$26+52$	$47+50$	$12+55$	$30+50$		
②	$6-5$	$9-5$	$8-5$	$37-15$		
	$83-51$	$69-50$	$97-55$	$80-50$		
③	$1+5+3$	$2+2+5$	$4+5-5$			
	$3+5-5$	$2+5-2$	$3-2+5$			
	$4-3+5$	$2+5-5$	$9-5-2$			
④	$\begin{array}{r} 12 \\ 35 \\ 50 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ 51 \\ 15 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 15 \\ 53 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 55 \\ -50 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 53 \\ -51 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 55 \\ -15 \\ \hline \end{array}$



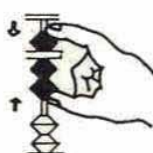
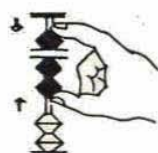
# STEP 4



$$1 + 6$$

1) Set 1 with thumb

2) Pinch together 6 (5 and 1)

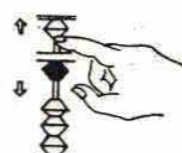


$$7 - 6$$

1) Pinch together 7 (5 and 2)

2) Subtract 1 with forefinger

3) Subtract 5 with forefinger



①	$2 + 7$	$3 + 6$	$1 + 8$	$2 + 6$
	$1 + 7$	$82 + 16$	$11 + 78$	$20 + 70$

②	$8 - 7$	$9 - 8$	$8 - 6$	$9 - 7$
	$9 - 6$	$37 - 16$	$89 - 68$	$80 - 70$

③	$3 + 6 - 7$	$8 - 7 + 6$	$7 - 6 + 8$
	$1 + 8 - 9$	$2 + 7 - 8$	$1 + 6 - 7$
	$9 - 7 + 6$	$3 + 6 - 7$	$9 - 8 - 1$

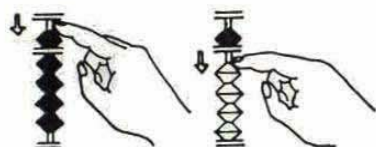
④	$\begin{array}{r} 12 \\ 76 \\ -37 \end{array}$	$\begin{array}{r} 32 \\ 67 \\ -98 \end{array}$	$\begin{array}{r} 21 \\ 76 \\ -67 \end{array}$	$\begin{array}{r} 11 \\ 87 \\ -68 \end{array}$	$\begin{array}{r} 88 \\ -63 \\ 60 \end{array}$	$\begin{array}{r} 49 \\ 50 \\ -96 \end{array}$
---	--	--	--	--	--	--

⑤	$\begin{array}{r} 3 \\ 1 \\ -2 \end{array}$	$\begin{array}{r} 7 \\ 2 \\ -3 \end{array}$	$\begin{array}{r} 4 \\ 5 \\ -6 \end{array}$	$\begin{array}{r} 9 \\ -2 \\ 1 \end{array}$	$\begin{array}{r} 4 \\ -3 \\ 8 \end{array}$
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$\begin{array}{r} 19 \\ -8 \\ 73 \end{array}$	$\begin{array}{r} 1 \\ 25 \\ 63 \end{array}$	$\begin{array}{r} 6 \\ 92 \\ -57 \end{array}$	$\begin{array}{r} 83 \\ 6 \\ -31 \end{array}$	$\begin{array}{r} 12 \\ 65 \\ -6 \end{array}$
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$\begin{array}{r} 38 \\ -26 \\ 52 \end{array}$	$\begin{array}{r} 71 \\ 16 \\ -72 \end{array}$	$\begin{array}{r} 56 \\ 31 \\ -25 \end{array}$	$\begin{array}{r} 21 \\ 72 \\ -41 \end{array}$	$\begin{array}{r} 25 \\ 62 \\ -50 \end{array}$
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# STEP 5



4 + 1 Set 4 with thumb

1) Add 5 with forefinger

2) Subtract 4 with forefinger

①  $4+1$        $3+3$        $3+2$        $4+4$   
 $2+3$        $54+23$        $41+24$        $30+40$

②  $3+2+1$        $2+2+1$        $2+4-5$   
 $7-5+3$        $4+2+2$        $3+4-6$   
 $1+4+2$        $9-6+3$        $8-6+4$

③  $\begin{array}{r} 41 \\ 23 \\ -14 \\ \hline \end{array}$        $\begin{array}{r} 32 \\ 53 \\ 12 \\ \hline \end{array}$        $\begin{array}{r} 62 \\ 34 \\ -25 \\ \hline \end{array}$        $\begin{array}{r} 43 \\ 54 \\ -80 \\ \hline \end{array}$        $\begin{array}{r} 27 \\ 31 \\ -56 \\ \hline \end{array}$        $\begin{array}{r} 89 \\ -58 \\ 37 \\ \hline \end{array}$

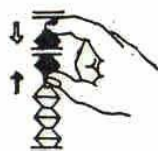
④  $\begin{array}{r} 2 \\ 1 \\ 3 \\ \hline \end{array}$        $\begin{array}{r} 3 \\ -2 \\ 4 \\ \hline \end{array}$        $\begin{array}{r} 2 \\ 2 \\ 3 \\ \hline \end{array}$        $\begin{array}{r} 9 \\ -5 \\ 1 \\ \hline \end{array}$        $\begin{array}{r} 4 \\ 4 \\ -7 \\ \hline \end{array}$

$\begin{array}{r} 2 \\ 14 \\ 63 \\ \hline \end{array}$        $\begin{array}{r} 23 \\ 2 \\ 54 \\ \hline \end{array}$        $\begin{array}{r} 68 \\ -5 \\ 13 \\ \hline \end{array}$        $\begin{array}{r} 74 \\ -60 \\ 1 \\ \hline \end{array}$        $\begin{array}{r} 4 \\ 92 \\ -85 \\ \hline \end{array}$

⑤  $\begin{array}{r} 42 \\ 31 \\ 22 \\ \hline \end{array}$        $\begin{array}{r} 87 \\ -56 \\ 48 \\ \hline \end{array}$        $\begin{array}{r} 31 \\ 64 \\ -70 \\ \hline \end{array}$        $\begin{array}{r} 95 \\ -50 \\ 42 \\ \hline \end{array}$        $\begin{array}{r} 49 \\ -16 \\ 23 \\ \hline \end{array}$

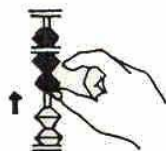
$\begin{array}{r} 72 \\ -50 \\ 46 \\ \hline \end{array}$        $\begin{array}{r} 41 \\ 37 \\ -25 \\ \hline \end{array}$        $\begin{array}{r} 98 \\ -53 \\ 14 \\ \hline \end{array}$        $\begin{array}{r} 24 \\ 33 \\ 40 \\ \hline \end{array}$        $\begin{array}{r} 43 \\ 24 \\ 31 \\ \hline \end{array}$

# STEP 6

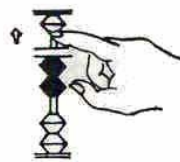


6 - 4

Pinch together 6



1) Add 1 with thumb



2) Subtract 5 with forefinger

①	5-1	7-3	5-3	8-4
	6-2	85-34	67-34	50-20

②	5+2-3	2+6-4	4+1-3
	2+3-1	2+4-2	6-3+4
	6-4+3	4+2-3	9-2-4

③	95	75	14	31	87	32
	-81	-43	43	24	-43	34
	23	17	-20	-42	30	-43

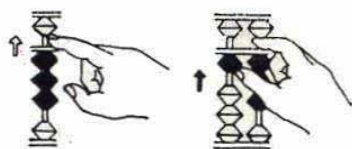
④	3	5	1	1	7
	2	-1	5	7	-3
	4	5	-2	-4	-1

	42	76	68	92	54
	35	20	-47	5	2
	1	-3	2	-84	-25

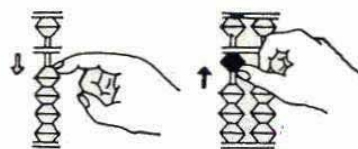
⑤	14	34	59	69	23
	72	51	-16	-25	32
	-65	-40	24	41	-43

	75	48	69	37	42
	-24	-13	-53	60	56
	30	-22	-14	-73	-64

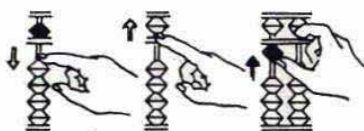
## STEP 7



8 + 5 : Pinch together 8  
 1) Subtract 5 with forefinger  
 2) Add 10 with thumb



2 + 8 : Set 2 with thumb  
 1) Subtract 2 with forefinger  
 2) Add 10 with thumb



6 + 4 : Set 6 with forefinger  
 1) Subtract 1, 2) Subtract 5,  
 3) Add 10 with thumb

①	3+8	2+9	4+7	4+6
	1+9	23+19	42+88	30+70
	9+6	8+9	7+8	8+7
	37+9	29+58	68+98	90+90

②	8+5	6+5	7+5	29+5
	26+15	87+52	75+55	80+50

③	8+2	9+3	9+2	26+4
	28+53	82+46	79+34	90+10

④	5	6	1	5	8
	-1	-4	1	4	-1
	7	8	9	8	9

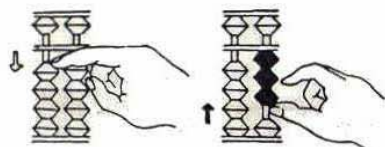
3	6	1	3	7
5	3	7	6	-1
8	5	5	2	4

⑤  $23+14+29$        $84+13-64$        $39+32+84$   
 $52+23+15$        $49+48-83$        $94+71-42$

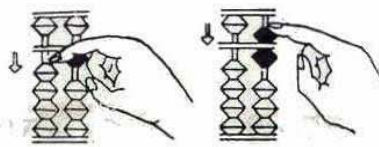
⑥  $\begin{array}{r} 56 \\ 21 \\ \hline 43 \end{array}$        $\begin{array}{r} 23 \\ 46 \\ \hline 42 \end{array}$        $\begin{array}{r} 38 \\ 49 \\ \hline 35 \end{array}$        $\begin{array}{r} 64 \\ 43 \\ \hline 24 \end{array}$        $\begin{array}{r} 78 \\ 54 \\ \hline 93 \end{array}$

$\begin{array}{r} 46 \\ 93 \\ \hline 21 \end{array}$        $\begin{array}{r} 97 \\ -34 \\ \hline 52 \end{array}$        $\begin{array}{r} 24 \\ 47 \\ \hline -41 \end{array}$        $\begin{array}{r} 83 \\ 34 \\ \hline -13 \end{array}$        $\begin{array}{r} 61 \\ 29 \\ \hline 80 \end{array}$

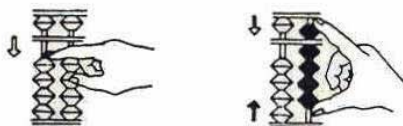
## STEP 8



10-7 : Set 10 with thumb  
 1) Subtract 10 with forefinger  
 2) Add 3 with thumb



11-5 : Set 11 with thumb  
 1) Subtract 10 with thumb  
 2) Add 5 with forefinger



10-1 : Set 10 with thumb  
 1) Subtract 10 with forefinger  
 2) Add 9 (pinch together)

①  $10-6$        $12-8$        $10-7$        $11-8$   
 $12-9$        $61-59$        $101-97$        $100-80$   
 $15-8$        $17-9$        $15-7$        $15-6$   
 $36-8$        $86-29$        $157-98$        $180-90$

②

4	7	18	14	6
6	8	-9	-5	5
-7	-6	7	6	-8
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

4	8	1	13	7
9	5	9	-5	4
-5	-4	-3	3	-2
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

③

95	91	82	46	114
-7	-5	-4	-17	-55
79	53	45	35	50
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

120	176	136	122	89
-89	-98	-57	-43	25
34	17	15	31	-32
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

④

$62+54-92$	$136-93+78$	$82+43-51$
$43+65-13$	$84+32-23$	$156-89+94$

⑤

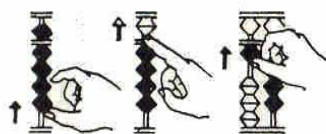
57	85	98	45	95
-29	53	-19	-27	45
52	-47	83	58	-56
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

92	95	71	82	121
68	-36	-54	77	-89
-53	-41	19	-95	34
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

	add→			total
add ↓	44	49	42	
	43	45	47	
	48	41	46	
total				



## STEP 9



8 + 6 : Set 8

1) Add 1 with thumb

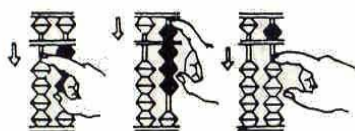
2) Subtract 5, 3) Add 10

①	5+6	5+9	6+8	25+7
	67+27	53+83	67+66	80+60

②	25+57-21	43+35+61	86-40+78
	12+43+85	28+46+72	110-45+79

③	3	2	51	46	83
	2	4	26	28	64
	9	6	67	73	-53
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	65	38	42	91	76
	28	-13	36	-24	46
	70	46	64	73	-59
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

## STEP 10



13-8 : Set 13

1) Subtract 10, 2) Add 5

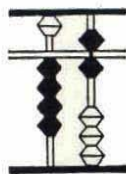
3) Subtract 3

①	12-6	14-9	13-8	42-7
	84-28	136-64	141-76	140-60

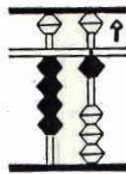
②	38+45-26	72+21-37	95+41-82
	65+61-72	131-76+87	55+67-46

③	6	26	13	134	102
	8	7	-6	-76	-37
	-9	-8	-4	-24	-41
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	56	95	143	68	83
	78	38	-78	76	36
	-69	-47	66	-87	-63
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

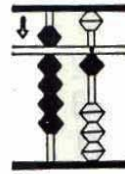
# STEP 11



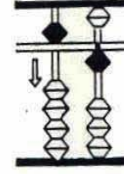
46 + 5  
Set 46



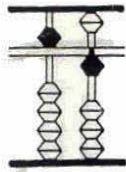
1) Subtract 5  
with forefinger



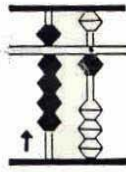
2) Add 50



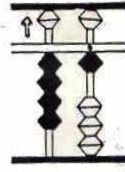
3) Subtract 40  
with forefinger



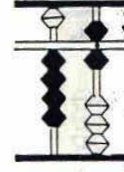
51 - 5  
Set 51



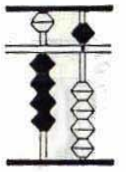
1) Add 40



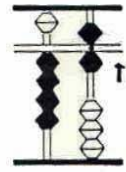
2) Subtract 50



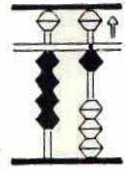
3) Add 5



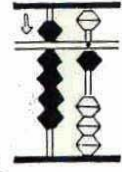
45 + 6  
Set 45



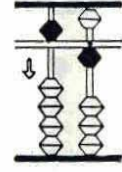
1) Add 1



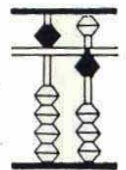
2) Subtract 5



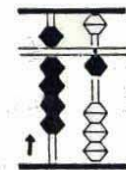
3) Add 50



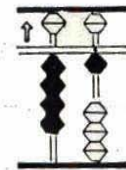
4) Subtract 40



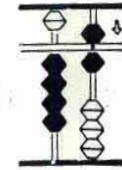
51 - 6  
Set 51



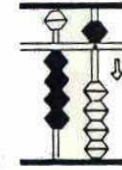
1) Add 40



2) Subtract 50



3) Add 5



4) Subtract 1

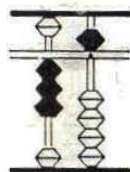
①  $43+8$        $48+7$        $48+5$        $46+7$   
 $18+34$        $28+26$        $35+18$        $19+31$

②  $52-9$        $57-8$        $50-5$        $52-4$   
 $74-26$        $72-23$        $63-17$        $90-41$

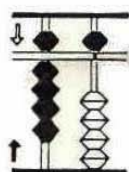
③  $\begin{array}{r} 36 \\ -23 \\ \hline 39 \end{array}$        $\begin{array}{r} 98 \\ -71 \\ \hline 29 \end{array}$        $\begin{array}{r} 84 \\ -46 \\ \hline 12 \end{array}$        $\begin{array}{r} 63 \\ -57 \\ \hline 46 \end{array}$        $\begin{array}{r} 16 \\ 37 \\ -48 \\ \hline \end{array}$

$\begin{array}{r} 61 \\ -18 \\ \hline 31 \end{array}$        $\begin{array}{r} 82 \\ -33 \\ \hline 21 \end{array}$        $\begin{array}{r} 96 \\ -49 \\ \hline 52 \end{array}$        $\begin{array}{r} 74 \\ -28 \\ \hline 15 \end{array}$        $\begin{array}{r} 21 \\ 61 \\ -36 \\ \hline \end{array}$

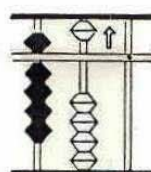
# STEP 12



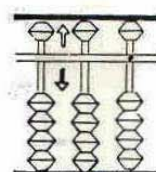
35 + 65  
Set 35



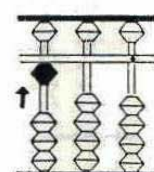
1) Add 60



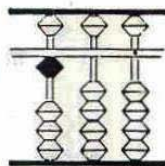
2) Subtract 5



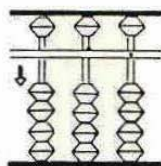
3) Subtract 90



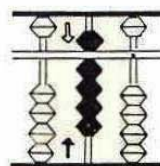
4) Add 100



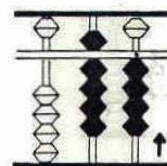
100 - 6  
Set 100



1) Subtract 100



2) Add 90



3) Add 4

①  $99+8$        $98+3$        $96+7$        $41+59$   
 $35+65$        $67+34$        $68+36$        $47+57$

②  $107-8$        $103-4$        $104-6$        $130-38$   
 $170-74$        $124-28$        $126-29$        $144-48$

③	$\begin{array}{r} 92 \\ -38 \\ \hline 49 \end{array}$	$\begin{array}{r} 73 \\ -25 \\ \hline 58 \end{array}$	$\begin{array}{r} 84 \\ -75 \\ \hline 93 \end{array}$	$\begin{array}{r} 35 \\ 68 \\ 43 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 15 \\ 66 \\ \hline \end{array}$
---	---	---	---	---	---

$\begin{array}{r} 161 \\ -67 \\ \hline 18 \end{array}$	$\begin{array}{r} 75 \\ 56 \\ -32 \\ \hline \end{array}$	$\begin{array}{r} 81 \\ 96 \\ -78 \\ \hline \end{array}$	$\begin{array}{r} 192 \\ -97 \\ \hline 81 \end{array}$	$\begin{array}{r} 86 \\ 27 \\ -16 \\ \hline \end{array}$
--	--	--	--	--

④  $36+12+65-19$

$105-83+79-46$

$27+26+98-53$

$71-24+97-48$

$101-25+58-37$

$91-45+86-34$

⑤	$\begin{array}{r} 48 \\ -12 \\ \hline 69 \\ 97 \end{array}$	$\begin{array}{r} 32 \\ 96 \\ -79 \\ \hline 54 \end{array}$	$\begin{array}{r} 92 \\ -25 \\ \hline 37 \\ 48 \end{array}$	$\begin{array}{r} 59 \\ 89 \\ 31 \\ 73 \\ \hline \end{array}$	$\begin{array}{r} 106 \\ -12 \\ -48 \\ 56 \\ \hline \end{array}$
---	---	---	---	---	--

⑥	$\begin{array}{r} 276 \\ 79 \\ 48 \\ 92 \\ \hline 6 \end{array}$	$\begin{array}{r} 58 \\ 94 \\ 73 \\ 46 \\ \hline 367 \end{array}$	$\begin{array}{r} 34 \\ 42 \\ 437 \\ 23 \\ \hline 68 \end{array}$	$\begin{array}{r} 427 \\ 24 \\ 94 \\ 56 \\ \hline 183 \end{array}$	$\begin{array}{r} 62 \\ 67 \\ 374 \\ 98 \\ \hline 259 \end{array}$
---	--	---	---	--	--

$\begin{array}{r} 378 \\ 53 \\ -64 \\ 86 \\ \hline -157 \end{array}$	$\begin{array}{r} 49 \\ 87 \\ 95 \\ -36 \\ -72 \\ \hline \end{array}$	$\begin{array}{r} 498 \\ 59 \\ -34 \\ -28 \\ -67 \\ \hline \end{array}$	$\begin{array}{r} 786 \\ -43 \\ -35 \\ 66 \\ -279 \\ \hline \end{array}$	$\begin{array}{r} 999 \\ -86 \\ -14 \\ -57 \\ -46 \\ \hline \end{array}$
--	---	---	--	--

### C. ANZAN (MENTAL CALCULATION)

If you close your eyes and concentrate your mind, you can see your parent's face or beautiful views, etc.

In the same way by concentrating to practice, the soroban will develop your imaginative ability in picturizing soroban beads in you head and you can work just as using a real soroban. This is called "reflective image ability", which everybody has.

By using imaginative soroban beads in your head you can calculate addition, subtraction, multiplication, division, which we call "anzan using and imaginative soroban".

By this way, you can calculate without using pencils or papers. It's fantastic isn't it?

Pages from 17 to 20 are specially made for anzan practice. Anzan is one of the final goals in practicing soroban in Japan. The best ways to practice anzan:

1. Asking your instructor or your friends to dictate numbers, moving invisible beads and then put your answers on the soroban.
2. Practice yourself, using soroban and soon after try again on the same problem in anzan.
3. Seeing the numbers, do anzan just as if you were using soroban.

#### STEP 1

1	2	3	4	5	6	7	8	9	10
1	4	2	3	4	5	3	2	3	4
5	5	5	5	5	5	7	8	7	6
-6	-9	-7	-8	-9	9	-9	6	-8	9
7	6	9	7	3	-5	5	-5	5	-5
-5	-5	-5	-5	5	6	-6	9	-7	6

#### STEP 2

1	2	3	4	5	6	7	8	9	10
4	6	9	3	8	6	7	8	9	6
6	-5	-5	7	-5	4	3	2	1	4
-9	9	6	-6	-3	-1	-2	-9	-8	-7
5	-7	-8	5	9	-5	-5	5	5	5
-6	5	5	-9	-5	6	7	4	3	-8

STEP 3

1	2	3	4	5	6	7	8	9	10
9	/	2	7	5	3	2	4	4	2
-5	9	5	-5	5	/	-/	-3	-2	2
6	7	3	8	-6	6	9	5	8	6
-4	3	-8	-2	5	-4	-6	4	5	-9
-5	-/	5	-5	/	-5	5	-/	5	3

STEP 4

1	2	3	4	5	6	7	8	9	10
9	5	6	9	7	8	6	9	2	3
-5	/	-/	-4	-2	-3	-/	-5	8	-2
6	-5	5	5	3	2	-5	-/	-4	9
-8	9	-2	-9	-5	-5	4	7	-5	-6
/	3	-3	5	7	-/	-2	-9	2	5

STEP 5

1	2	3	4	5	6	7	8	9	10
6	7	8	/	/	/	5	5	4	2
4	3	2	/	2	/	2	4	/	3
5	4	9	5	5	8	3	/	5	5
5	5	/	3	2	7	/	3	/	4
/	/	4	9	3	3	2	/	5	2

STEP 6

1	2	3	4	5	6	7	8	9	10
5	5	5	3	5	7	2	9	/	8
-4	-/	-3	2	-4	-5	-/	-4	4	2
9	6	5	4	2	8	2	-3	-/	-4
-6	-3	3	-5	2	-6	7	2	-3	-/
-3	-2	-/	-2	3	-/	-8	7	9	-2



## STEP 7

1	2	3	4	5	6	7	8	9	10
/	/	2	3	5	3	2	4	/	2
6	8	6	7	3	2	/	6	4	8
3	/	2	4	2	2	5	8	5	4
/	5	3	6	6	3	2	2	2	5
5	2	/	8	4	9	8	3	/	/

## STEP 8

1	2	3	4	5	6	7	8	9	10
6	9	8	7	7	9	7	9	7	6
5	5	5	5	5	6	8	6	3	/
9	/	2	/	8	5	2	/	8	5
2	5	/	5	9	3	3	5	7	2
5	3	4	2	5	5	/	7	/	6

## STEP 9

1	2	3	4	5	6	7	8	9	10
7	3	5	8	6	6	8	7	4	4
2	7	5	5	9	-3	-4	-3	8	/
-4	-5	-9	-9	-1	5	-2	5	-9	-3
-1	-2	2	/	-5	2	8	-8	4	8
5	6	8	-2	-8	-7	-3	4	-3	-9

## STEP 10

1	2	3	4	5	6	7	8	9	10
5	5	7	6	8	2	6	6	7	8
6	9	7	8	6	8	-4	3	7	6
3	5	3	2	/	-7	9	5	-8	-9
7	/	8	6	9	9	-6	-9	6	8
/	4	2	3	4	-7	8	/	3	-7

## STEP 11

1	2	3	4	5	6	7	8	9	10
33	66	44	87	55	21	55	24	13	86
55	-55	55	-55	24	34	-11	31	42	-31
11	44	-33	23	-13	-53	44	-23	-11	-21
-44	33	-66	44	-55	31	-22	14	22	34
-55	-53	22	-77	68	22	-33	-32	-43	-53

## STEP 12

1	2	3	4	5	6	7	8	9	10
21	79	82	42	34	52	75	19	33	70
57	50	70	38	18	35	83	68	29	15
50	21	23	53	49	73	45	95	38	25
32	45	25	70	68	54	12	59	77	66
40	60	44	67	36	97	62	64	45	34

## STEP 13

1	2	3	4	5	6	7	8	9	10
70	84	72	36	42	84	25	68	72	89
-26	32	84	25	35	92	89	45	-58	-61
52	-59	-65	91	93	-67	74	32	46	73
34	45	30	-87	-56	31	-63	-70	93	46
-98	-60	99	53	-74	-66	-71	-58	-85	-58

## STEP 14

1	2	3	4	5	6	7	8	9	10
46	83	51	94	80	24	38	79	17	72
89	18	60	29	-34	58	90	34	23	89
-70	99	-16	-27	76	71	-29	51	80	-66
55	-66	48	88	79	-56	77	-65	-22	58
-27	-35	-76	-95	-63	24	66	32	36	-97

## D. EXAMINATION PROBLEMS

### 1. 9-Kyu (Nineth Grade)

#### Addition and Subtraction

(Time limit : 10minutes)

(70%accuracy required)

1	2	3	4	5
53	9	6	61	4
94	8	17	3	10
5	60	8	40	78
17	-3	49	-8	1
9	26	3	2	53
36	-14	50	-79	9
8	7	7	24	5
20	8	15	-6	36
7	-52	2	80	9
1	40	39	5	27

6	7	8	9	10
12	8	70	97	5
4	56	4	1	60
8	37	3	30	9
70	-2	91	9	2
4	95	68	-74	84
63	4	2	3	41
85	-10	6	51	6
2	9	50	-5	20
90	71	2	-68	3
6	-3	84	2	78

## 2. 8-Kyu (Eighth Grade)

### Addition and Subtraction

(Time limit : 10minutes)

(70%accuracy required)

1	2	3	4	5
26	48	71	34	50
58	30	59	81	97
70	19	48	90	16
32	-64	20	53	81
41	97	36	-72	34
79	70	45	-89	62
25	-35	87	25	40
80	18	14	36	93
69	-21	60	-10	76
43	56	29	67	82

6	7	8	9	10
62	95	39	87	13
53	40	14	16	80
18	28	67	-90	49
37	-67	20	25	37
40	91	75	74	92
85	38	42	-13	60
29	10	36	68	45
54	-53	50	51	28
70	26	79	-42	96
91	-84	18	30	75

### 3. 7-Kyu (Seventh Grade)

#### Addition and Subtraction

(Time limit : 10minutes)

(70%accuracy required)

1	2	3	4	5
24	731	69	307	825
61	20	854	714	49
307	96	687	-28	306
59	-504	42	650	61
82	658	970	86	293
930	-19	16	39	87
576	471	53	-163	970
648	35	91	921	15
29	140	504	-75	628
804	-86	732	-490	36
72	-327	48	38	401
315	98	120	52	74

6	7	8	9	10
12	580	98	416	93
450	92	406	38	824
79	38	817	45	570
634	601	53	-360	61
506	-13	320	56	936
28	-854	72	701	89
95	478	65	187	45
147	35	937	-72	602
81	921	14	-948	58
370	-62	59	23	730
52	-709	740	-15	419
893	46	621	209	27



#### 4. 6-Kyu (Sixth Grade)

##### Addition and Subtraction

(Time limit : 10minutes)

(70%accuracy required)

1	2	3	4	5
281	19	465	87	603
764	461	209	306	18
79	970	87	572	769
402	48	612	-51	825
690	-132	850	739	57
28	506	96	614	930
943	-94	473	-280	541
87	463	941	892	26
135	-57	324	31	802
291	789	67	905	794
56	-201	35	-763	13
304	315	840	18	630
523	850	972	-49	471
870	-683	51	-654	986
65	72	108	320	24

6	7	8	9	10
74	58	972	36	160
580	801	765	541	387
251	423	17	725	92
48	630	403	-307	548
795	-17	96	79	203
306	546	140	480	76
53	-908	681	-91	694
429	682	28	612	189
170	15	572	-158	21
97	-734	34	73	460
312	491	907	806	975
408	-52	360	594	83
65	-869	95	-62	507
189	320	851	-240	342
236	97	423	831	59



# ANSWERS

P. 4				P. 5				P. 6				P. 7			
STEP 1				STEP 2				STEP 3				STEP 4			
3	6,052	2	8	4	1	7	3	0	67	8	1	9	97	9	1
7	4,007	3	8	4	3	7	0	13	98	6	4	9	98	9	1
14		4	9	4	1	6	0	13		9	3	4	89	9	7
20		4	9	8	2	5	6	44		38	22	3	18	2	9
68		4	9	8	2	5	5	0		78	32	5	23	8	0
85		32	79	9	12	65	8	43		97	19	6	64	98	3
50		34	98	9	13	55	6	56		67	42	6		21	0
526		44	60	9	21	80	6	57		80	30	2		10	8
809				9			6	57				2			2
300								78							0

P. 7				P. 8				P. 9				P. 10			
STEP 4				STEP 5				STEP 6				STEP 7			
2	64	5	50	6	95	4	4	37	9	21	11	15	13	10	11
6	15	6	97	5	79	4	4	49	9	45	11	15	11	12	10
3	62	5	71	7	25	2	2	37	4	67	11	46	12	11	11
8	52	5	17	5	87	4	4	13	4	85	10	87	34	30	17
9	37	8	2	1	56	4	4	74	3	12	10	136	41	81	16
84		77	68	79	68	51	7	23	78	81	42	180	139	128	16
89		65	79	79	53	33	5		93	13	130		130	113	14
41		76	76	76	59	30	3		25	2	100		130	100	13
58		6	15	97			3		13	24	15				11
71			11	98					31	34	17				10

P. 1				P. 12				P. 13			
STEP 7				STEP 8				STEP 9			
66	120	4	8	3	167	24	80	11	61	14	6
33	111	4	9	9	139	121	91	14	139	12	5
155	122	3	28	16	123	74	162	14	124	144	5
90	131	3	57	15	64	95	76	32	140	147	35
14	225	3	59	3	109	93	84	94	146	94	56
123	160	2	90	8	65	161	107	136	144	163	72
	115	4		9	95		18	135		71	65
	30	20		7	94		36	135		142	80
	104	7		11	110		64	140			
	170	8		9	82		66			63	

P. 14				P. 15				P. 16				P. 17			
STEP 11				STEP 12				STEP 13				STEP 14			
5	51	43	52	107	99	103	94	202	501			2	0	1	3
25	55	49	56	101	99	106	55	103	638			1	8	19	13
3	53	45	50	103	98	102	98	152	604			4	7	7	5
34	53	48	52	100	92	146	96	252	784			2	0	3	6
24	52	48	5	100	96	102	97	102	860			8	4	10	10
65	54	49	74	101	96	112	98		296			20	10	1	1
86	53	46	70	104	97	99			123			0	10	9	2
131	50	49	99	104	96	99			428			20	10	9	1
57			61		176				495			0	10	20	3
56			46		97				796			20	0	4	9

P. 18				P. 19				P. 20				P. 21			
STEP 15				STEP 16				STEP 17				STEP 18			
5	6	7	8	9	0	11	12	13	14			9-kyu	8-kyu	7-kyu	6-kyu
21	1	16	27	9	22	0	200	32	93			250	523	3,907	5,518
20	5	17	23	9	24	35	255	42	99			89	218	1,313	3,326
24	9	14	20	11	27	22	244	220	67			196	469	4,186	6,130
19	2	28	20	3	25	22	270	118	89			122	215	2,051	2,687
13	8	20	34	1	28	79	205	40	138			232	631	3,745	7,489
20	3	19	28	3	5	55	311	74	121			344	539	3,347	4,013
13	2	18	21	7	13	33	277	54	242			265	124	1,153	1,483
14	11	23	28	5	6	14	305	17	131			380	440	4,202	6,344
16	10	13	26	4	15	23	222	68	134			46	206	280	3,919
16	3	20	20	1	6	15	210	89	56			308	575	4,454	4,796